

CLAIMS

S-SD, 1 What is claimed is:

2 1. A method of distributing image prints printed on a plurality of printers to a
3 plurality of recipients, the method comprising:
4 receiving an order specifying one or more recipients and, for each specified recipient, a
5 set of one or more images associated with that recipient; and
6 for each recipient specified by the order, separating the images associated with the
recipient into at least one printable unit of images.

1 2. The method of claim 1 further comprising, for each printable unit, selecting a
2 printer on which to print the printable unit.

1 3. The method of claim 2 further comprising, for each printable unit, printing at least
2 one copy of each image in the printable unit on the selected printer.

1 4. The method of claim 1 wherein each image has associated print parameters.

1 5. The method of claim 4 wherein the images in a printable unit of images have print
2 parameters that allow the printable unit to be continuously printed.

1 6. The method of claim 1 wherein images in a first recipient's image set differ from
2 images in a second recipient's image set.

1 7. The method of claim 4 wherein print parameters of a first recipient's image set
2 differ from print parameters of a second recipient's image set.

1 8. The method of claim 7 wherein print parameters include one or more of print size,

2 number of copies, and/or print finish.

1 9. The method of claim 1 wherein print parameters differ among images within an
2 image set.

1 10. The method of claim 9 wherein print parameters include one or more of print size,
2 number of copies, and/or print finish.

1 11. The method of claim 1 wherein each image set comprises an arbitrary grouping of
2 images designated by a user.

1 12. The method of claim 1 further comprising, for each recipient, separating the
2 images associated with the recipient into one or more sub-orders.

1 13. The method of claim 12 wherein separating the images associated with the
2 recipient into at least one printable unit of images includes, for each sub-order, separating the
3 images associated with the sub-order into one or more sub-batches, each sub-batch representing a
4 printable unit.

1 14. The method of claim 13 wherein the images in a sub-batch have print parameters
2 that allow the sub-batch to be continuously printed.

1 15. The method of claim 13 wherein a plurality of orders is received, the images
2 associated with each recipient specified in each order are divided into at least one sub-order, and
3 each sub-order is divided into at least one sub-batch.

1 16. The method of claim 15 further comprising assembling at least one batch

2 including one or more sub-batches, wherein each sub-batch can be continuously printed on the
3 same type of printer.

1 17. The method of claim 16 wherein the images in a batch have print parameters that
2 allow the batch to be continuously printed.

1 18. The method of claim 16 wherein the at least one batch includes sub-batches from
2 two or more different sub-orders.

1 19. The method of claim 16 further comprising scheduling the batches to be printed in
2 a predetermined ordering.

1 20. The method of claim 19 wherein each order includes image data and control data.

1 21. The method of claim 20 wherein the control data includes at least one of print
2 parameters, user contact information, recipient information, payment information, and message
3 information.

1 22. The method of claim 21 wherein the image data includes pixel data for the images
2 in the order.

1 23. The method of claim 22 wherein the control data is used to control the printing of
2 the images.

1 24. The method of claim 20 further comprising, before printing each image:
2 correcting the image data for that image using information including the control data; and
3 calibrating the image data using information including the control data and at least one

4 characteristic of the printer on which the image is to be printed.

1 25. The method of claim 20 further comprising, for each batch, storing the image data
2 for the batch in a cache that is local to the selected printer for that batch.

1 26. The method of claim 25 further comprising, for each batch, placing the control
2 data for the batch in a queue associated with the selected printer for that batch.

1 27. The method of claim 26 further comprising, for each batch that is placed in a
2 queue, sending the image data associated with the images included in that batch to an image
3 processor associated with the selected printer for that batch.

1 28. The method of claim 27 wherein, for each batch that is placed in a queue, sending
2 the image data for that batch to the image processor associated with that queue before the batch
3 reaches the front of the queue.

1 29. The method of claim 1 further comprising verifying that an image print was
2 printed with the correct image.

1 30. The method of claim 1 further comprising checking the quality of the image print.

1 31. The method of claim 13 further comprising:
2 combining the image prints from at least two sub-batches from the same sub-order; and
3 distributing the combined image prints to the recipient associated with the at least two
4 sub-orders.

1 32. The method of claim 1 further comprising printing a destination identifier print

2 that identifies the specified recipient for a corresponding sub-batch of image prints.

1 33. The method of claim 32 wherein the destination identifier print delimits the
2 corresponding sub-batch.

1 34. The method of claim 32 wherein printing the destination identifier print comprises
2 printing one or more of the following items: a shipping address, a recipient's name, a print index,
3 a bar code, a textual message and/or print re-ordering information.

1 35. A method of generating physical manifestations of digital content on a plurality of
2 output devices, the method comprising:

3 receiving an order specifying one or more recipients and, for each specified recipient, a
4 set of digital content associated with that recipient;

5 for each recipient specified by the order, separating the digital content associated with the
6 recipient into at least one generatable unit of digital content; and

7 for each generatable unit of digital content, generating a physical manifestation of the unit
8 of digital content.

1 36. The method of claim 35 further comprising, for each generatable unit of digital
2 content, selecting an output device on which to generate a physical manifestation of the unit of
3 digital content.

1 37. The method of claim 36 wherein each generatable unit of digital content is
2 generated on the output device selected for that generatable unit.

1 38. The method of claim 35 further comprising distributing the physical
2 manifestations to their respective recipients.

1 39. The method of claim 35 wherein a set of digital content comprises one or more
2 digital images.

1 40. The method of claim 39 wherein the physical manifestation of the set of digital
2 content comprises photographic prints of the one or more digital images.

1 41. The method of claim 40 wherein the images in a generatable unit of images have
2 generation parameters that allow the generatable unit to be continuously generated.

1 42. The method of claim 41 wherein the print parameters include one or more of print
2 size, number of copies, and/or print finish.

1 43. A print distribution system comprising:
2 a plurality of printers;
3 a front-end computer sub-system for receiving an order specifying one or more recipients
4 and, for each specified recipient, a set of one or more images associated with that recipient; and
5 a scheduler, connected to the front-end computer sub-system and the plurality of printers,
6 that for each recipient specified by the order (a) separates the images associated with the
7 recipient into at least one printable unit of images, and (b) designates a printer on which each
8 printable unit is to be printed.

1 44. The system of claim 43 wherein each image has associated print parameters.

1 45. The system of claim 44 wherein the images in a printable unit of images have
2 print parameters that allow the printable unit to be continuously printed.

1 46. The system of claim 43 wherein images in a first recipient's image set differ from
2 images in a second recipient's image set.

1 47. The system of claim 43 wherein print parameters of a first recipient's image set
2 differ from print parameters of a second recipient's image set.

1 48. The system of claim 47 wherein print parameters include one or more of print
2 size, number of copies, and/or print finish.

1 49. The system of claim 47 wherein print parameters differ among images within an
2 image set.

1 50. The system of claim 49 wherein print parameters include one or more of print
2 size, number of copies, and/or print finish.

1 51. The system of claim 43 wherein each image set comprises an arbitrary grouping
2 of images designated by a user.

1 52. The system of claim 43 wherein the scheduler:
2 for each recipient, separates the images associated with the recipient into one or more
3 sub-orders; and
4 for each sub-order, separates the images associated with the sub-order into one or more
5 sub-batches, each sub-batch representing a printable unit.

1 53. The system of claim 52 wherein:
2 the front-end computer sub-system receives a plurality of orders; and
3 the scheduler, for each recipient, separates each order into one or more sub-orders and,

4 for each sub-order, separates each sub-order into one or more sub-batches.

1 54. The system of claim 53 wherein the scheduler assembles at least one batch
2 including one or more sub-batches, wherein each sub-batch can be continuously printed on the
3 same type of printer.

1 55. The system of claim 54 wherein the scheduler schedules the batches to be printed
2 in a predetermined ordering.

1 56. The system of claim 55 wherein the scheduler uses a global scheduling algorithm.

1 57. The system of claim 55 wherein the scheduler uses a just-in-time scheduling
2 algorithm.

1 58. The system of claim 55 further comprising a plurality of line controllers, each line
2 controller being associated with a printer and having a queue for storing the batches until they are
3 printed by the printer.

1 59. The system of claim 58 wherein each order includes image data and control data.

1 60. The system of claim 59 wherein the control data includes at least one of print
2 parameters, user contact information, recipient information, payment information, and message
3 information.

1 61. The system of claim 60 wherein the image data includes pixel data for the images
2 in the order.

1 62. The system of claim 61 further comprising an image cache local to the scheduler
2 for caching the image data.

1 63. The system of claim 58 further comprising an image processor associated with at
2 least one of the line controllers for processing the image data and at least a portion of the control
3 data prior to printing the image.

1 64. The system of claim 63 wherein the image processor further comprises image
2 processor software in a computer-readable medium comprising instructions for causing the
3 image processor to perform the following operations:

4 correct the image data using information including the control data; and
5 calibrate the image data using information including the control data and at least one
6 characteristic of the designated printer.

1 65. The system of claim 64 wherein the image processor software further comprises
2 instructions for causing the image processor to generate a destination identifier image, wherein
3 the destination identifier image can be used to print a destination identifier print that identifies
4 the specified recipient for a corresponding sub-batch of image prints and is generated from at
5 least the sub-batch's control data.

1 66. The system of claim 65 wherein the destination identifier image for each sub-
2 batch is generated from the sub-batch's control data and image data.

1 67. The system of claim 64 wherein the image cache includes software in a computer-
2 readable medium comprising instructions for causing the image cache to perform the following
3 operation:

4 in response to a message from the scheduler indicating that the scheduler has sent control

5 data for a batch to the line controller, send the image data for that batch to the image processor
6 associated with that queue.

1 68. The system of claim 43 further comprising a backprinter for backprinting at least
2 one image print.

1 69. The system of claim 68 wherein the backprinter backprints non-image information
2 on each image print.

1 70. The system of claim 69 wherein the non-image information includes at least one
2 of an image number associated with the image, a printable unit number associated with the
3 printable unit from which the image print was printed, reorder information, a bar code, and a
4 message.

1 71. The system of claim 70 wherein the message is an advertisement.

1 72. The system of claim 71 wherein the bar code encodes at least one of an audio
2 message, the image number associated with the image, and the printable unit number associated
3 with the printable unit from which the image print was printed.

1 73. The system of claim 59 further comprising a digital camera for capturing data
2 about at least one of the image prints.

1 74. The system of claim 73 wherein the camera is a low-resolution camera.

1 75. The system of claim 73 wherein the captured data is used to verify that the an
2 image print was printed with the correct image data.

1 76. The system of claim 73 wherein the captured data is used to check the quality of
2 the image print.

1 77. The system of claim 43 further comprising an inverter that inverts each image
2 print prior to backprinting.

1 78. The system of claim 77 further comprising a curl reduction equipment that
2 reduces curling of the image print prior to backprinting.

1 79. The system of claim 78 wherein the curl-reduction equipment uses suction to
2 reduce curling of the image print.

1 80. The system of claim 79 wherein the curling-reduction equipment device includes
2 a vacuum table.

1 81. The system of claim 77 further comprising an alignment device that aligns each
2 image print prior to backprinting.

1 82. The system of claim 81 wherein the alignment device includes:
2 an alignment wall against which each image print is to be aligned prior to backprinting;
3 and
4 a skew conveyor that receives each image print after the image print has been printed and
5 moves the image print towards the alignment wall as the skew conveyor conveys the image print
6 to the backprinter.

1 83. The system of claim 82 further comprising an alignment sensor positioned

2 laterally inward from the alignment wall that detects whether a portion of the image print is
3 positioned immediately beneath the alignment sensor.

1 84. The system of claim 83 wherein the alignment sensor is a photosensor that
2 optically senses the presence of the image print.

1 85. The system of claim 43 further comprising a conveyor on which image prints are
2 stacked after printing.

1 86. The system of claim 85 further comprising a controller, connected to the
2 conveyor, that advances the conveyor so that a new stack can be stacked after all the image prints
3 in a printable unit have been stacked on the conveyor.

1 87. The system of claim 86 further comprising a plurality of bins, positioned on the
2 conveyor, so that the image prints for a printable unit are stacked in a bin.

1 88. The system of claim 87 wherein the bin comprises:
2 a base for supporting the bin when the bin is placed on a surface of the conveyor;
3 a first bottom wall connected to the base so that the first wall has a pitch incline with
4 respect to the surface of the conveyor; and
5 a second bottom wall connected to a first end of the first wall at one end, the second wall
6 and first wall forming an angle so that image prints received in the bin tend to stack on the first
7 bottom wall with an edge of each image print registering with the second bottom wall.

1 89. The system of claim 52 further comprising a storage device in which one or more
2 sub-batches can be stored for later combination with other sub-batches.

1 90. An alignment device used for aligning image prints, the alignment device
2 comprising:
3 an alignment wall against which each image print is to be aligned; and
4 a skew conveyor that receives each image print after the image print has been printed and
5 moves the image print towards the alignment wall as the image print is conveyed along the skew
6 conveyor.

1 91. The alignment device of claim 90 further comprising an alignment sensor
2 positioned laterally inward from the alignment wall that detects whether a portion of the image
3 print is positioned immediately beneath the alignment sensor.

1 92. The system of claim 91 wherein the alignment sensor is a photosensor that
2 optically senses the presence of the image print.

1 93. A bin for collecting image prints comprising:
2 a base for supporting the bin when the bin is placed on a surface;
3 a first bottom wall connected to the base so that the first wall has a pitch incline with
4 respect to the surface; and
5 a second bottom wall connected to a first end of the first wall at one end, the second wall
6 and first wall forming an angle so that image prints received in the bin tend to stack on the first
7 bottom wall with an edge of each image print registering with the second bottom wall.

1 94. The bin of claim 93 wherein the first bottom wall has an access notch formed
2 therein that provides access to any image prints stacked in the bin.

1 95. The bin of claim 93 further comprising a side wall mounted to a side edge of the
2 first and second bottoms walls.

1 96. The bin of claim 95 wherein the first bottom wall has a roll incline with respect to
2 the surface so that image prints received in the bin tend to stack on the first bottom wall with an
3 edge of each image print registering with the second bottom wall.

1 97. A method of tracking an order specifying a plurality of recipients and, for each
2 specified recipient, a sub-order of one or more images associated with that recipient, wherein
3 each image is to be printed, packaged, and shipped, the method comprising:

4 indicating that the image is in a first state when the order with which the image is
5 associated has been received from a user;

6 indicating that the image is in a second state when the image is being processed;

7 indicating that the image is in a third state when an image print created from the image
8 has been packaged; and

9 indicating that the image is in a fourth state when the image print has been shipped.

1 98. The method of claim 97 further comprising indicating that the image is in a fifth
2 state if the image is stored.

1 99. The method of claim 98, wherein the first state is an entered state, the second state
2 is a processing state, the third state is a packaged state, the fourth state is a shipped state, and the
3 fifth state is a stored state.

1 100. The method of claim 97, further comprising, if an error is detected while the
2 image is in the second state and before the image is in the third state, reprinting the image.

1 101. A method of checking an image print that was printed from an image stored in an
2 electronic file, the method comprising:

3 generating a first image signature based on the electronic file;
4 generating a second image signature based on the image print; and
5 signaling an error if a predetermined criterion that is a function of the first and second
6 signatures is met.

1 102. The method of claim 101 wherein generating the first image signature includes
2 sampling the electronic file to create a lower-resolution image based on the image.

1 103. The method of claim 102 wherein generating the second image signature includes
2 taking a picture of the printed image.

1 104. The method of claim 102 wherein the Haar feature-recognition algorithm is used
2 to determine if the predetermined criterion is met.

1 105. The method of claim 103 wherein the pictures are taken at substantially the same
2 resolution as the lower-resolution image.

1 106. The method of claim 105 wherein the lower-resolution image and the picture each
2 comprise a plurality of pixels.

1 107. The method of claim 106 further comprising signaling a second error if a
2 predetermined number of pixels in the lower-resolution image do not match corresponding pixels
3 in the picture.

1 108. The method of claim 101 wherein the predetermined criterion is that the first and
2 second signatures correlate within a predetermined tolerance.

1 109. The method of claim 101 wherein checking comprises confirming that the image
2 prints are printed in the correct order.

1 110. The method of claim 101 wherein checking comprises examining the quality of
2 the image prints.

1 111. A method of generating an image print from an image, the method comprising:
2 receiving an image;
3 printing the image to generate an image print;
4 reducing curling of the image print; and
5 backprinting information on the back of the image print.

1 112. The method of claim 111 wherein the image includes image data and control data.

1 113. The method of claim 111 wherein the image is printed on a printer.

1 114. The system of claim 113 further comprising, before printing the image:
2 correcting the image data for the image using information including the control data; and
3 calibrating the image data using information including the control data and at least one
4 characteristic of the printer.

1 115. The method of claim 111 wherein the information backprinted on to the image
2 includes non-image information.

1 116. The method of claim 115 wherein the non-image information includes at least one
2 of an image number associated with the image, reorder information, a bar code, and a message.

1 117. The method of claim 116 wherein the message is an advertisement.

1 118. The method of claim 117 wherein the bar code encodes at least one of an audio
2 message and an image number.

1 119. The method of claim 118 wherein the image number is associated with the image.

1 120. The method of claim 111 further comprising inverting the image print prior to
2 backprinting.

1 121. The method of claim 120 further comprising aligning the inverted image print
2 prior to backprinting.

1 122. The method of claim 111 wherein curling of the image print is reduced using
2 suction.

1 123. The method of claim 122 wherein curling of the image print is reduced using a
2 vacuum table.

1 124. The method of claim 121 further comprising verifying that an image print was
2 printed with the correct image.

1 125. The method of claim 111 further comprising checking the quality of the image
2 print.

1 126. A print system for printing images, the system comprising:
2 a front-end computer sub-system that receives an order specifying one or more images

3 and one or more recipients;

4 a printer sub-system, connected to the front-end computer sub-system, that prints image
5 prints from the images in the order;

6 a packaging sub-system that receives image prints from the printer sub-system and
7 packages the image prints for shipment to the order's recipient; and

8 a shipping sub-system that receives the packaged image prints from the packaging sub-
9 system and ships the packaged image prints to the order's recipient;

10 wherein the images are processed automatically by the front-end sub-system, the printer
11 sub-system, the packaging sub-system, and the shipping sub-system.

127. A method of distributing image prints comprising:

1 receiving set of one or more image prints, the set having one or more associated
2 recipients;

3 indicating which type of packaging material is to be used to package the set of image
4 prints based on information printed on at least one of the image prints in the set of image prints;
5 and

6 indicating which method of shipping is to be used to ship the set of image prints based on
7 information printed on at least one of the image prints in the set of image prints.

128. The method of claim 127 further comprising packaging the set of image prints

2 using the indicated type of packaging material.

129. The method of claim 127 further comprising shipping the set of image prints

2 using the indicated shipping method.

130. The method of claim 127 wherein indicating which type of packaging material is

2 to be used includes lighting a light associated with the indicated type of packaging material.

1 131. The method of claim 127 wherein indicating which shipping method is to be used
2 includes lighting a light associated with the indicated shipping method.

1 132. The method of claim 127 wherein the information printed on at least one image
2 print includes a bar code.

1 133. The method of claim 132 further comprising reading the bar code printed on at
2 least one image print.

1 134. The method of claim 133 wherein the type of packaging material to be used to
2 package the set of image prints is indicated based on the bar code.

1 135. The method of claim 133 wherein the method of shipping to be used is indicated
2 based on the bar code.

1 136. A packaging system comprising:

2 a plurality of packaging bins for storing image print packaging material;

3 a plurality of visual indicators, wherein each packaging bin is associated with at least one

4 visual indicator, wherein the visual indicators associated with the packaging bins are used to

5 indicate in which packaging bin the packaging material for a set of image prints is stored.

1 137. The system of claim 136 further comprising a plurality of shipping bins for
2 storing packaged image prints, wherein each shipping bin is associated with at least one visual
3 indicator and at least one shipping method; and wherein the visual indicators indicate in which
4 shipping bin a packaged set of image prints should be stored for subsequent shipping by the
5 shipping method associated with the indicated shipping bin.

1 138. The system of claim 137 wherein the visual indicators are used to sort the packaged
2 image prints by method of shipping.

1 139. The system of claim 137 wherein each shipping bin is associated with a range of
2 weights.

1 140. The system of claim 139 wherein the visual indicators are used to sort the packaged
2 image prints by weight and method of shipping.

1 141. The system of claim 137 wherein each shipping bin is associated with one or
2 more ZIP codes.

1 142. The system of claim 141 wherein the visual indicators are used to sort the packaged
2 image prints by ZIP code and method of shipping.

1 143. The system of claim 136 wherein the visual indicators comprise a plurality of
2 lights.

1 144. The system of claim 136 further comprising a display monitor, and wherein the
2 visual indicators are displayed on the display monitor.

1 145. The system of claim 136 further comprising a storage rack for storing image
2 prints for subsequent combination with other image prints.

1 146. The system of claim 145 wherein the storage rack further includes plurality of
2 cubby-holes, each cubby-hole having an associated visual indicator.

1 147. The system of claim 146 wherein the visual indicators are used to indicate in
2 which cubby-hole a given image print is to be stored for subsequent combination with other
3 image prints.

1 148. The system of claim 147 wherein the visual indicators are used to indicate from
2 which cubby-hole a given image print is to be removed for combination with other image prints.